APERÇU DES PROBLÈMES QUE POSENT LES RONGEURS DANS LES PAYS EN DÉVELOPPEMENT

Résumé

Diverses espèces de rongeurs attaquent les cultures dans les pays en développement. La prévention des pertes dues à ces ravageurs permettrait d'atténuer sensiblement la faim, mais l'on ne peut s'attendre à de rapides progrès dans ce domaine. Il est indispensable d'intensifier les recherches et d'améliorer l'application des technologies existantes.

CUADRO GENERAL DE LOS PROBLEMAS CAUSADOS POR LOS ROEDORES EN LOS PAISES EN DESARROLLO

Resumen

Hay distintas especies de roedores que constituyen plagas graves para diversos cultivos en los países en desarrollo. La prevención de las pérdidas ocasionadas por esas plagas representaría una contribución importante al alivio del hambre, pero no se prevén progresos rápidos en ese sentido. Es esencial intensificar los esfuerzos de la investigación, y aplicar mejor la tecnología existente.

Overview of rodent problems in developing countries

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Summary. Differing species of rodents are serious pests in various crops in the developing countries of the world. The prevention of losses resulting from these pests would represent an important contribution towards the alleviation of hunger, but rapid progress in this cannot be expected. Expanded research efforts and better application of existing technology are essential.

Although half the world's population is actively engaged in agriculture, and in spite of the many advances in agricultural technology, millions of people in scores of nations still suffer from hunger, malnutrition and starvation (Wortman and Cummings, 1978). Rodent pests play a very important role in limiting agricultural production. Rodent damage in agriculture involves a variety of crops and rodent species, causing damage either directly or indirectly at any time during crop development or post-harvest storage. Direct losses are related to the actual destruction of food by consumption, contamination or other means. Indirect losses are those that result from an interference with the means of production such as by damage to equipment or irrigation systems, the incapacitation of workers or animals because of illness, and other similar problems. Forests, pastures, grain crops, stored products, orchards, equipment and livestock are all liable to damage by rodents.

The various agro-ecosystems in the developing world cover a broad spectrum: from slash-and-burn plots to small, multicrop subsistence farms to large monoculture plantations. That rodents are pests of some notoriety in each of these situations is not a recent

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phenomenon. For example, depictions on Incan and pre-Incan pottery show rodents feeding on ears of corn; in the agricultural calendar of the Incas, protection of crops from rodents and other vertebrate pests was specified along with cultivation, harvest and storage (Rhoades and Bidegaray, 1983).

Yet rodent pests have received relatively little of the attention and resources that have been invested in agricultural development. Agriculturists and others involved in food production have devoted vast amounts of time, effort and money to insect control, for example, while vertebrate pests in general have been largely ignored. While most agricultural universities offer major programmes in weed science, applied entomology, plant pathology and other areas dealing with agricultural pests, the number of universities that offer academic curricula in vertebrate pest management probably are fewer than ten throughout the world. Only a few countries are attempting research into these problems despite the fact that they are actually quite serious in some areas and potentially so in others.

Rodents as agricultural pests

The conflicts between rodents and the economic interests or well-being of mankind are the same throughout the world; disease transmission, food destruction, reduced timber and forage production and physical damage. Many different species are involved and, taking into account the great diversity of ecological conditions around the world, the resolution of rodent pest problems will require much study and understanding.

Damage by rodents is often accepted as part of the normal scheme of things in agriculture. It is considered unavoidable and only minor attempts are made to evaluate damage, identify species or attempt control.

Rice is probably the crop most severely affected by rodents, although damage to other crops may be of primary concern on a localized basis. Wood (1971) estimated that rats were responsible for yield reductions of greater than 60 percent in rice and Fall (1977) reported that rat damage is a limiting factor in rice production in some areas of the Philippines, even precluding successful production of crops during some parts of the year. Maize, sorghum, millet and wheat are other important cereal crops affected. Sugar cane is a major crop of tropical areas that is particularly susceptible to rodent damage and one where such damage is often unnoticed or ignored. Direct rat damage to sugar cane is often minimal, but the gnawing opens the rind and the ensuing fermentation dramatically reduces the sugar content.

Rodents cause severe losses in coconuts in almost all countries where they are grown. In the Comoros, over 30 percent of the total coconut crop is lost annually through rodent damage (Evans, 1984); losses as high as 77 percent have been documented in the coconut plantations of Colombia (Elias and Valencia, 1973). Oil palm, cacao and groundnuts are often seriously affected. Bananas seem to be especially susceptible to damage by geomyid rodents (pocket gophers) in Central America (Sisk, 1982). Other fruits, garden crops, tuberous crops such as cassava, legumes, melons, squash and even cotton may be attacked. Poultry, fish and young animals are not immune to predatory attacks by rodents. Rodents serve as reservoirs for numerous diseases or parasites that are transmissible to man and domestic animals, and they may also affect human or animal health by limiting food availability, thus contributing to malnourishment.

Rodent damage to foodstuffs is not limited to standing crops. The most lamentable food losses are those that occur after harvest; the entire investment (time, money, labour and supplies) employed to plant, cultivate, protect, harvest and store the crop is lost. That rodents play a significant role in post-harvest food losses is a widely accepted premise (National Research Council, 1978). That the true magnitude of the problem is unknown is fact. The extent of losses in post-harvest situations is unknown because there are no practical methods for obtaining loss estimates (Harris and Linblad, 1978).

Rodents are reported as impediments to successful reforestation in many countries; in Chile, for example, *Octodon bridgesi* was described as the major pest in reforested areas (O. Ramirez, personal communication). Studies yielded estimates of a 43-percent incidence of damage and a tree mortality of one in eight in young plantations (Rodriguez M. and Herrera, 1984).

A dramatic example of the impact of rodents in developing countries is the recent rodent population explosions in the Sahelian region of Africa documented by representatives of several international development agencies including GTZ, USAID and FAO. These were serious enough to prompt requests for emergency assistance from two of the countries and the declaration of a disaster situation in another. Similar occurrences have been reported from the Syrian Arab Republic and other countries of the Near East.

Challenges to rodent pest management

While these few examples illustrate the impact that rodent pests can have on agriculture, the truth is that quantification of the magnitude of this impact is meagre at best. While the biology of a few rodent species is well known, knowledge of most rodents in the developing world is very limited. Some are known only from single museum specimens. Others are more common but basic information on their geographic and altitudinal distributions, preferred habitats, food habits, life cycles, and taxonomic relationships is lacking (MacKenzie, 1972; Walker, 1975). This paucity of fundamental information bears directly upon our ability to define and resolve rodent pest problems. Some years ago, Hopf, Morley and Humphries (1976) studied the existing knowledge of rodent damage to crops and stored products in the tropical and subtropical areas of the world. Their report concluded that "the one single fact which emerges most clearly from the survey is the widespread ignorance of the magnitude of the rodent problem, and means to control it". The author believes the situation is much the same as it was when this statement was originally published.

Among the factors important to an understanding of the role of rodents as agricultural pests in developing countries are the effects of agricultural development projects. It is a paradox that increasingly progressive farming practices and more technology-intensive agriculture seem to lead to concomitant increases in the complexity and intensity of rodent pest problems.

Efforts to increase agricultural production in developing countries involve environmental changes that also influence the extent of rodent damage problems. A principal means for countries to increase production is to bring new lands under cultivation by clearing forest or scrub or draining marsh areas. Rodent population increases have often been associated with such habitat disturbances. In addition, chronic losses are accentuated when rodents move from adjacent uncultivated lands to exploit the available food sources in newly cultivated fields (Fall, 1982).

Some approaches to increasing production on land already under cultivation also appear to influence agricultural rodent pest problems. Irrigation, for example, results in changes in farming practices as well as changes in the behaviour of rodent populations. Elimination of the natural scheduling of the planting season coupled with quick-growing crop varieties results in a situation with crops of different ages in close proximity; hence a source of food is available for a long period of the year. Development of canals and impoundments creates additional favourable habitats.

Aside from purely technical challenges involved in the management of rodent pests in developing countries, other factors must also be considered. For example, unlike most other agricultural pests, cultural and sociological factors contribute to the challenge of managing rodent pests. Whereas insects, weeds or pathogenic organisms are not generally regarded as having souls nor afforded religious protection, rodents are sometimes regarded as both intelligent and revengeful by people in some developing countries (Adhikarya and

Posamentier, in press; Canby, 1977; Jackson, 1981). In some developed countries, concerns for animal welfare, "humane" treatment and animal "rights" have extended to rats and the means used to control them (Jackson, 1981). Such views can be of critical importance in the choice and public acceptance of effective strategies for management.

Outlook

Contacts with agricultural personnel, reviews of available literature, and firsthand observations indicate that rodent depredations of agricultural crops occur throughout the developing world and are, in some situations, a limiting factor to agricultural production. Most developing countries have inadequate rodent pest control programmes. This is because few of those persons responsible for crop protection in these countries have any training or experience in rodent pest control. In addition, the countries themselves generally lack the resources required.

Food production is controlled by a myriad of interlocking factors and forces. Rodent pests constitute a small but significant piece in this mammoth puzzle. Certainly, the prevention of losses to these pests would represent an important contribution to the reduction of hunger problems in the developing nations of the world. However, rapid progress in improving rodent control programmes in the developing nations cannot be expected until the adverse impact of rodent pests on agricultural production receives the attention it merits. Evidence from both developed and developing countries has repeatedly shown that expanded research and better application of existing technology are essential to counter these problems. Long-term solutions to rodent pest problems in agriculture (and public health) will require increased emphasis on training and support for coordinated research efforts in the developing areas of the world.

References

ADHIKARYA, R. & POSAMENTIER, H. *Motivating farmers for action: how strategic multi-media campaigns can help.* Eschborn, Frankfurt, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ). (In press)

CANBY, T.Y. 1977. The rat, lapdog of the devil. *Natl Geographic*, 152(1): 60-87.

ELIAS, D.J. & VALENCIA, G. 1973. *Control de roedores en el cocotero.* ICA Informa 8: 5, 6, 13, 14. Insto. Colombiano Agropecuario, Bogotá.

EVANS, D. 1984. *Rodent control in coconut plantations and rural villages: a descriptive analysis of a World Bank project in the Comoro Islands.* Univ. California, Davis. (M.Sc. thesis)

FALL, M.W. 1977. *Rodents in tropical rice.* Tech. Bull. No. 36, Rodent Res. Center, Univ. Philippines, Los Baños, College, Laguna.

FALL, M.W. 1982. Agricultural development and the ecology of rodent control. In *Alternative strategies for desert development and management*, Vol. 2, p.443-451. Proc. UNITAR. Intern. Conf. Sacramento, California, 31 May - 10 June 1977. New York, Pergamon Press.

HARRIS, K.L. & LINBLAD, C.J., eds. 1978. Preamble to the methodology [of standard measurement techniques], p. 77-82. In *Post-harvest grain loss assessment methods.* St. Paul, Minn., American Association of Cereal Chemists. 193 pp.

HOPF, H.S., MORLEY, G.E.J. & HUMPHRIES, J.P.O. 1976. *Rodent damage to growing crops and to farm and village storage in tropical and sub-tropical regions. Results of a postal survey 1972-73.* London, Centre for Overseas Pest Research and Tropical Products Institute. 115 pp.

JACKSON, W.B. 1977. Evaluation of rodent depredations to crops and stored products. *EPPO Bull.*, 7(2): 439-458.

JACKSON, W.B. 1981. *Of men and rats.* University Professor Lecture Series, Bowling Green State University, Bowling Green, Ohio.

MACKENZIE, R.B. 1972. Public health importance of rodents in South America. *Bull. World Health Organ.*, 47: 161-169.

NATIONAL RESEARCH COUNCIL, 1978. *Post-harvest food losses in developing countries.* Washington, National Academy of Sciences. 206 pp.

RHOADES, R.E. & BIDEGARAY, P. 1983. Aspectos socioeconómicos de las plagas de vertebrados: tradición y cambio. In *Symposium: Zoologia económica y vertebrados como plagas de la agricultura, IX Congreso Latinoamericano de Zoologia, Arequipa, Perú*, p.49-64.

RODRIGUEZ M., J.A. & HERRERA, G.L.A. 1984. *Evaluación del daño ocasionado por* Octodon bridgesi *en plantaciones de* Pinus radiata. (Unpublished ms.)

SISK, T. 1982. *A report on Central American pocket gopher,* Orthogeomys *sp.; biology and control in Costa Rica.* ICM Field Biology Program, San José, Costa Rica.

WALKER, E.P. 1975. *Mammals of the World*, Vol. II., 3rd ed. Baltimore and London, Johns Hopkins University Press, 1 500 pp.

WOOD, B.J. 1971. Investigations of rats in rice fields demonstrating an effective control method giving substantial yield increases. *PANS*, 17(2): 180-193.

WORTMAN, S. & CUMMINGS, R.W. Jr. 1978. *To feed this world: the challenge and the strategy.* Baltimore and London, Johns Hopkins University Press. 440 pp.